

IN THE CLAIMS:

This listing of claims will replace all prior versions, and listings, of the claims as follows:

1. (Original) A method for the treatment of a particular volume of tissue, said volume of tissue containing an endogenous pigment, the method comprising the steps of:

treating the particular volume of tissue with light to promote a simultaneous two-photon photoactivation of said pigment in the particular volume of tissue, wherein the pigment becomes photochemically activated in the particular volume of tissue.

2. (Original) The method of Claim 1 wherein the light to promote said simultaneous two-photon photoactivation is a laser light produced by a laser.

3. (Original) The method of Claim 2 wherein the laser light comprises a train of one or more ultrashort pulses.

4. (Original) The method of Claim 2 including operating the laser to produce light at a wavelength between approximately 450 nm to 1400 nm.

5. (Original) The method of Claim 1 wherein the light to promote said simultaneous two-photon photoactivation is a focused beam of light.

6. (Original) The method of Claim 5 wherein the focused beam of light is focused laser light.

7. (Original) The method of Claim 6 wherein said particular volume of tissue is located substantially at the tissue surface.

8. (Original) The method of Claim 6 wherein said particular volume of tissue is located substantially below the tissue surface.

9. (Original) The method of Claim 1 wherein said step of treating the particular volume of tissue includes positioning a focus of a beam of light over a range of positions so that a focal plane of the light beam occurs at a site located between a surface of the tissue and a point substantially beyond the tissue surface, whereby said step of treating the particular volume of tissue may extend to penetrate deep within the tissue.

10. (Original) The method of Claim 9 further including varying, while the beam of light is extant, the radial position of the focal plane within the tissue, thereby to photoactivate the endogenous pigment at a multiplicity of positions between the tissue surface and a position located substantially beyond the tissue surface.

11. (Original) The method of Claim 1 wherein said endogenous pigment becomes photoactivated in said particular volume at a controllable position substantially beyond a tissue surface.

12. (Original) The method of Claim 1 further comprising the step of controlling the photoactivation by varying the location, irradiance and duration of said light.

13. (Original) The method of Claim 1 wherein the light to promote said simultaneous two-photon excitation of the endogenous pigment is a non-focused beam of light.

14. (Original) The method of Claim 13 wherein said particular volume of tissue is located substantially at the tissue surface.

15. (Original) The method of Claim 13 wherein said particular volume of tissue is located substantially below the tissue surface.

16. (Original) The method of Claim 1 wherein said endogenous pigment is selected from the group comprising melanin, melanin precursors, carotenes, porphyrins, and various tattoo dyes.

17. (Original) The method of Claim 16 wherein said melanin precursors are selected from the group comprising 5-S-cysteinyl-dopa (5-SCD) and 5,6-dihydroxyindole (DHI), dopa, dopa semiquinone, leucodopachrome, dopachrome, eumelanins, pheomelanins, sepia melanins, and 5,6-dihydroxyindole-2-carboxylic acid.

18. (Original) The method of Claim 16 wherein said porphyrins include hemoglobin.

19. (Original) A method for producing a photoactivated product in a particular volume of a material, the method comprising treating the particular volume of the material with light to promote a simultaneous two-photon excitation of an endogenous pigment contained in the particular volume of the material, wherein the pigment becomes a photoactivated product in the particular volume of the material.

20. (Original) The method of Claim 19 wherein the light to promote said simultaneous two-photon photoactivation is a laser light produced by a laser.

21. (Original) The method of Claim 20 wherein the laser light comprises a train of one or more ultrashort pulses.

22. (Original) The method of Claim 20 including operating the laser to produce light at a wavelength between approximately 450 nm to 1400 nm.

23. (Original) The method of Claim 19 wherein the light to promote said simultaneous two-photon photoactivation is a focused beam of light.

24. (Original) The method of Claim 23 wherein the focused beam of light is focused laser light.

25. (Original) The method of Claim 24 wherein said particular volume of material is tissue located substantially at the surface of said material.

26. (Original) The method of Claim 24 wherein said particular volume of material is tissue located substantially below the surface of said material.

27. (Original) The method of Claim 19 wherein said step of treating the particular volume of material includes positioning a focus of a beam of light over a range of positions so that a focal plane of the light beam occurs at a site located between a surface of the material and a point substantially beyond the material surface, whereby said step of treating the particular volume of material may extend to penetrate deep within the material.

28. (Original) The method of Claim 27 further including varying, while the beam of light is extant, the radial position of the focal plane within the material, thereby to photoactivate the endogenous pigment at a multiplicity of positions between the material surface and a position located substantially beyond the material surface.

29. (Original) The method of Claim 19 wherein said endogenous pigment becomes photoactivated in said particular volume at a controllable position substantially beyond a material surface.

30. (Original) The method of Claim 19 further comprising the step of controlling the photoactivation by varying the location, irradiance and duration of said light.

31. (Original) The method of Claim 19 wherein the light to promote said simultaneous two-photon excitation of the endogenous pigment is a non-focused beam of light.

32. (Original) The method of Claim 31 wherein said particular volume of material is located substantially at the surface of said material.

33. (Original) The method of Claim 31 wherein said particular volume of material is tissue located substantially below the surface of said material.

34. (Original) The method of Claim 19 wherein said endogenous pigment is selected from the group comprising melanin, melanin precursors, carotenes, porphyrins, and various tattoo dyes.

35. (Original) The method of Claim 34 wherein said melanin precursors are selected from the group comprising 5-S-cysteinyl dopa (5-SCD) and 5,6-dihydroxyindole (DHI), dopa, dopa semiquinone, leucodopachrome, dopachrome, eumalanins, pheomelanins, sepia melanins, and 5,6-dihydroxyindole-2-carboxylic acid.

36. (Original) The method of Claim 34 wherein said porphyrins include hemoglobin.

37. (Original) A method for treatment of tissue wherein the tissue includes an endogenous pigment, the method comprising the steps of:

directing light to specific regions of interest within the tissue, including regions substantially below a tissue surface, said light being selected to penetrate the tissue and to promote two-photon excitation substantially only at a focal zone;

controlling the location of said focal zone over a range of depths within said tissue; and
using two-photon excitation, photoactivating said pigment over said range of depths within said tissue, thereby producing a photoactivated product substantially only at the focal zone.

38. (Original) The method of Claim 37 wherein said directing step includes directing a laser light produced by a laser to said regions of interest.

39. (Original) The method of Claim 38 wherein the laser light comprises a train of one or more ultrashort pulses.

40. (Original) The method of Claim 38 including operating the laser to produce light at a wavelength between approximately 450 nm to 1400 nm.

41. (Original) The method of Claim 37 wherein the light to promote said two-photon photoactivation is a focused beam of light.

42. (Original) The method of Claim 41 wherein the focused beam of light is focused laser light.

43. (Original) The method of Claim 42 wherein said regions of interest are located substantially at the tissue surface.

44. (Original) The method of Claim 42 wherein said regions of interest are located substantially below the tissue surface.

45. (Original) The method of Claim 42 further comprising the step of scanning said regions of interest with said focused beam of light to promote two-photon excitation throughout said regions of interest.

46. (Original) The method of Claim 37 wherein said endogenous pigment becomes photoactivated in said focal zone at a controllable position substantially beyond a tissue surface.

47. (Original) The method of Claim 37 wherein said two-photon photoactivation is simultaneous two-photon activation.

48. (Original) The method of Claim 37 further comprising the step of controlling the photoactivation by varying the location, irradiance and duration of said light.

49. (Original) The method of Claim 37 wherein the light to promote said two-photon excitation of the photoactive agent is a non-focused beam of light.

50. (Original) The method of Claim 49 wherein said regions of interest are located substantially at the tissue surface.

51. (Original) The method of Claim 49 wherein said regions of interest are located substantially below the tissue surface.

52. (Original) The method of Claim 37 wherein said endogenous pigment is selected from the group comprising melanin, melanin precursors, carotenes, porphyrins, and various tattoo dyes.

53. (Original) The method of Claim 52 wherein said melanin precursors are selected from the group comprising 5-S-cysteinyl-dopa (5-SCD) and 5,6-dihydroxyindole (DHI), dopa, dopa semiquinone, leucodopachrome, dopachrome, eumelanins, pheomelanins, sepia melanins, and 5,6-dihydroxyindole-2-carboxylic acid.

54. (Original) The method of Claim 52 wherein said porphyrins include hemoglobin.

55-74. (Canceled)

75. (Original) A method for treatment of a particular volume of tissue, said volume of tissue containing an endogenous pigment and an exogenous photodynamic agent, the method comprising the steps of:

treating the particular volume of tissue with light to promote a simultaneous two-photon photoactivation of said pigment and said agent in said particular volume of tissue, wherein the pigment becomes photochemically converted into a phototoxic product in the particular volume of tissue and said photodynamic agent becomes photoactivated in the particular volume of tissue.

76. (Original) The method of Claim 75 wherein said exogenous photodynamic agent is selected from the group comprising Rose Bengal, psoralen derivatives, indocyanine, Lutex, Sn(ET)₂, and various porphyrin derivatives, including porfimer sodium and benzoporphyrin derivative.

77. (Original) The method of Claim 75 wherein the particular volume of tissue is pretreated with said exogenous photodynamic agent such that the particular volume of tissue retains a portion of said agent at the time the particular volume of tissue is treated with light so as to promote simultaneous two-photon activation of said agent.

78-96. (Canceled)

97. (Original) The method of Claim 1 further comprising the step of heating said volume of tissue using said light so to produce a hyperthermic effect and controlling the hyperthermic effect

by varying the location, irradiance and duration of said light so as to augment the effectiveness of said photoactivation.

98. (Original) The method of Claim 19 further comprising the step of heating said volume of material using said light so to produce a hyperthermic effect and controlling the hyperthermic effect by varying the location, irradiance and duration of said light so as to augment the effectiveness of said photoactivation.

99. (Original) The method of Claim 1 wherein said photochemical activation of said pigment includes conversion of said pigment into a phototoxic product.

100. (Original) The method of Claim 1 wherein said photochemical activation of said pigment includes photobleaching of the pigment in said tissue.

101. (Original) The method of Claim 100 wherein said tissue is selected from the group comprising moles, freckles, hair follicles and tattoos.

102. (Original) The method of Claim 19 wherein said photoactivated product is a phototoxic product.

103. (Original) The method of Claim 19 wherein said photoactivation of said pigment includes photobleaching of the pigment in said material.

104. (Original) The method of Claim 103 wherein said material is selected from the group comprising moles, freckles, hair follicles and tattoos.

105. (Original) The method of Claim 37 wherein said photoactive product is a phototoxic product.

106. (Original) The method of Claim 37 wherein said photoactivating of said pigment includes photobleaching of said pigment in said tissue.

107. (Original) The method of Claim 106 wherein said tissue is selected from the group comprising moles, freckles, hair follicles and tattoos.

108-110. (Canceled)